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GMM

SPECIFICATION GUIDE

(GMM EC, GMM sincon, GMM step and GMM phase cut)

CONTENTS

MANUFACTURER AND SUPPLIER ADDRESS		
INTRODUCTION		
PROTOCOL FRAME		
INTERFACE PARAMETERS.....	3	STATUS OF THE DIGITAL INPUTS OF THE GMM EC.....
LINE TERMINATION	4	FUNCTION CURRENT INPUT AI1
COMMUNICATION PROCESS.....	4	RAW VALUE AI1.....
COMMAND FROM MASTER	4	SCALED VALUE AI1.....
ANSWER OF THE GMM.....	5	FUNCTION CURRENT INPUT AI2
DATA BYTES	6	SCALED VALUE AI2.....
REGISTERS		FUNCTION RESISTOR INPUT AI3.....
PROGRAMMING HINT	10	RAW VALUE AI3.....
HOLDING REGISTER OVERVIEW	10	SCALED VALUE AI3.....
CONTROL VALUE	12	FUNCTION RESISTOR INPUT AI3.....
OPERATING MODE.....	12	(0..10 V)
AUTOMATIC INTERNAL.....	12	RAW VALUE / VOLTAGE INPUT AI4
AUTOMATIC EXTERNAL ANALOG	12	SCALED VALUE AI4.....
CONTROL PARAMETER.....	14	STATUS MANUAL MODE.....
SETPOINT	18	CONTROL VALUE MANUAL MODE
WATCHDOG	20	TYPE OF MOTORCONTROL
REFRIGERANT	21	(GMM EC, GMM SINCON, ETC.).....
MODBUS ADDRESS	22	CURRENT ENERGIE CONSUMPTION OF ONE
MODBUS BAUDRATE	23	MOTOR OR IN TOTAL
MODBUS PARITY/FRAMING	24	CURRENT ENERGIE CONSUMPTION OF ONE
STATUS MANUAL MODE.....	25	OR ALL VFD.....
CONTROL VALUE MANUAL MODE	26	MOTOR TEMPERATURE
STATUS THRESHOLD VALUE.....	27	(ONLY WITH GMM EC THREE-PHASE MOTOR)
THRESHOLD VALUE DEPENDING ON	28	HEATSINK TEMPERATURE.....
THRESHOLD VALUE LIMIT	29	CURRENT FANSPEED
THRESHOLD VALUE AMBIENT TEMPERATURE	30	(IN RPM)
THRESHOLD VALUE EMERGENCY VALUE STATUS.....	31	FAULTS / ALARMS FROM GMM.....
THRESHOLD VALUE/EMERGENCY CONTROL VALUE	32	ERRORS/ALERTS OF EC MOTORS.....
NUMBER OF SETPOINTS.....	33	CURRENT FANSPEED AS PERCENTAGE
STATUS NIGHTSETBACK	34	F THE MAXIMUM SPEED.....
NIGHTSETBACK LIMIT	35	ERRORS / ALARMS / IO-STATE OF THE VFD
MANUAL INVERSE OPERATION.....	36	OPERATING HOURS PER FAN.....
HEAT EXCHANGER TYPE.....	37	CURRENT AIR VOLUME AS PERCENTAGE OF
FANCYCLING ON/OFF	38	THE MAXIMUM AIR VOLUME.....
HYSTERESIS OFF	39	STATUS OF DIGITAL OUTPUTS OF GMM.....
INPUT REGISTER OVERVIEW	40	STATUS OF STEPS OF STEP CONTROLLER
NUMBER OF MOTORS, STEPS,		(ONLY AVAILABLE AT GMM STEP!).....
VFD'S, OUTPUT STAGE.....	41	NUMBER OF ERROR MESSAGES OF GMM
		(ONLY AVAILABLE AT GMM STEP PROFESSIONAL!)
		STATUS OF DIGITAL OUTPUTS OF GIOD.....
		(ONLY AVAILABLE AT GMM STEP!).....
		STATUS OF THE DIGITAL INPUTS OF GIOD
		(ONLY AVAILABLE AT GMM STEP!).....
		STATUS INFO GMM.....
		NOTES.....

SAFETY PRECAUTION DEFINITIONS

	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
	Indicates a potentially hazardous situation or practice which, if not avoided, will result in death or serious injury.
	Indicates a potentially hazardous situation or practice which, if not avoided, will result in damage to equipment and/or minor injury.
	Indicates an operating procedure, practice, etc., or portion thereof which is essential to highlight.

MANUFACTURER AND SUPPLIER ADDRESS

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INTRODUCTION

This document specifies the Modbus parameters used by Frick, a Johnson Control Company.

It assumes the reader is familiar with the general Modbus specifications:

- MODBUS over Serial Line Specification & Implementation Guide V1.0

- MODBUS Application Protocol Specification V1.1 These documents are available online at modbus.org

The above Modbus specifications form the basis of this document and apply in full measure except for the restrictions described in this document.

Via its external Modbus interface the GMM receives specifications from a higher-level controller, which it places in its registers and uses to control the system. It also makes information available to the outside via the Modbus interface. (for example, motor temperatures and the current values of pressure and temperature)

The higher-level controller supplies data such as the following:

- Specified setpoint as a pressure or temperature
- Setpoint 1 as a pressure or temperature
- Setpoint 2 as a pressure or temperature

- Directly specified control values when the GMM is in slave mode

For detailed information about operating conditions and functions, please refer to the relevant manuals: this information is not covered by this document.

The table below provides an overview of the compatibility of Modbus modules with the software of the GMM controller.

PROTOCOL FRAME

The data transfer defined in this specification will only work in a Master-Slave Environment. The data transfer is controlled by the modbus-master, the GMM is always modbus slave.

A shielded twisted pair cable has to be used for data communication (RS485 standard). We recommend following bus cables:

Helukabel – Devicenet PUR flexibel

Belden – 9841 Multi-Conductor – Low Capacitance Computer Cable for RS-485 Applications Lapp Group – UNITRONIC BUS LD

Only the RTU transmission mode will be supported.

INTERFACE PARAMETERS

The following interface parameters are used as standard values: RS485 standard (Modbus RTU)

9600 baud (8 data bits, no parity, 1 stop bit)

All bus subscribers must comply with these parameters.

If necessary, these interface parameters can be modified via Modbus or by entering settings on the unit (Service menu → functions → Ext bus module). This requires at least the following conditions to be fulfilled (or a higher version number):

GCM Modbus module: Firmware version: Modbus RTU: 20/20

GMM EC Firmware version: V041a/b

GMM sincon: Firmware version: V005a/b

GMM step: Firmware version: V002a/b

GMM phasecut: Firmware version: V001a/b

Hardware module name	Software version on the GMM controller
GCM MOD GMM EC08.1 (ERP 5203905)	from GMM EC V036
GCM MOD GMM EC16.1 (ERP 5203906)	from GMM EC V036
GCM MOD GMM EC.1 (ERP 5206415), replaces modules with ERP no.: 5203905, 5203906	from GMM EC V043
GCM MOD GMM Rail.1 (ERP 5204182)	from GMM EC V036 from GMM sincon V002 from GMM step V004 from GMM phasecut V002
GCM MOD GMM Rail.1 (ERP 5206762), replaces the module with ERP no.: 5204182	from GMM EC V043 from GMM sincon V007 from GMM step V005 from GMM phasecut V003

LINE TERMINATION

Bus termination: 120 Ohm at the beginning and end of the bus line. Participants in the middle of the bus will not be terminated.

COMMUNICATION PROCESS

MODBUS over Serial Line Specification & Implementation guide V1.0 defines following communication process:

	Start	Address	Function Code	Data	CRC Lowbyte	CRC Highbyte
Command	>3.5 char	8 bits	8 bits	N * 8 bits	8 bits	8 bits
Answer	>3.5 char	8 bits	8 bits	N * 8 bits	8 bits	8 bits

COMMAND FROM MASTER

Address:

The address field has a size of 8 bits.

Address range: 0..247

The broadcast address 0 is not supported by Modbus module.

Default address for GMM is address 1, but it is possible to change the address in the service menu of the GMM.

Command

The following commands of the specification "MODBUS Application Protocol Specification V1.1" are supported:

Code	Command
03h	Read Holding Register
04h	Read Input Register
06h	Write single holding register

Data:

The length of databytes depends on the transmitted command (see Data Bytes, Page 10).

CRC Low / CRC High

The Cyclic Redundancy Check is generated over the full message.

The polynom used for the CRC generation is $1 + x^2 + x^{15} + x^{16}$ (XOR – Calculation with A001h).

Start value is FFFFh.

The low byte of the CRC is sent first, followed by the high byte.

For further information about the crc generation see "MODBUS over Serial Line Specification & Implementation guide".

ANSWER OF THE GMM

The GMM only answers, if:

- it is addressed by the correct address
- the length of the data bytes is correct
- the CRC is correct

Synchronization:

After the end of the command, the GMM will wait at least the time length of 3.5 bytes.

The pause depends on the command. The timeout is 100ms.

Address:

The address in the command of the master will be repeated.

Command:

If it is possible to process the command, the command code will be repeated.

If it is not possible to process the command, the GMM will answer with an exception.

This is, for example, the byte 83h for the command "Read Holding Register (03h)"

In the following example the master control tries to read a non-existent register.

(FFFFh) In this case the exception code is 02h: Illegal Coil Address

Command: 01h 03h FFh FFh 00h 01h 84h 2Eh			
Address	Modbus Member	Byte 1	01h
Function Code	Read Single Register	Byte 2	03h
Data	Register Address (High Byte)	Byte 3	FFh
	Register Address (Low Byte)	Byte 4	FFh
	Register value (High Byte)	Byte 5	00h
CRDC	Register value (Low Byte)	Byte 6	01h
	CRC Check sum (Low Byte)	Byte 7	84h
	Check sum (High Byte)	Byte 8	2Eh

Answer: 01h 83h 02h C0h F1			
Address	Modbus member	Byte 1	01h
Function Code	Lese Input Register	Byte 2	83h
Data	Exception Code	Byte 3	02h
CRC	Check sum (Low Byte)	Byte 6	C0h
	Check sum (High Byte)	Byte 7	F1h

Data

The length of the data bytes and its function depends on the transmitted command. (see Data Bytes, Page 10)

CRC Low / CRC High:

The checksum CRC will be generated over the full message.

The check sum is calculated as described in Command from Master, Page 8.

DATA BYTES

Read Holding Register

Command: 03h

With this command it is possible to read the content of a holding register.

Holding registers are parameters with read/write access.

Command: MM 03h R_ADR_H R_ADR_L R_AMO_H R_AMO_L CRC_L CRC_H			
Address	Modbus Member	Byte 1	MM
Function Code	Read Single Register	Byte 2	03h
Data	Register Address (High Byte)	Byte 3	R_ADR_H
	Register Address (Low Byte)	Byte 4	R_ADR_L
	Register Amount (High Byte)	Byte 5	R_AMO_H
CRC	Register Amount (Low Byte)	Byte 6	R_AMO_L
	Check sum (Low Byte)	Byte 7	CRC_L
	Check sum (High Byte)	Byte 8	CRC_H

⚠ CAUTION

Only single read register is supported!

Answer: MM 03h BC R_VAL_H R_VAL_L CRC_L CRC_H			
Address	Modbus member	Byte 1	MM
Function Code	Lese Holding Register	Byte 2	03h
Data	Byte Count	Byte 3	BC
	Register Value (High Byte)	Byte 4	R_VAL_H
	Register Value (Low Byte)	Byte 5	R_VAL_L
CRC	Check sum (Low Byte)	Byte 6	CRC_L
	Check sum (High Byte)	Byte 7	CRC_H

Exception Codes:

In case of a data processing error the answer will be an exception.

02h: The allowed address range of the Holding Registers D000h – D0XXh (hexadecimal) was exceeded

03h: An invalid number of registers was read.

04h: A holding register could not be read, because a hardware error occurred.

0Bh: The GMM controller does not answer, disturbed CAN network.

Read Single Input Register

Command: 04h

With this command it is possible to read the content of exactly one input register.

Input registers are parameters with read-only access.

Command: MM 04h R_ADR_H R_ADR_L R_AMO_H R_AMO_L CRC_L CRC_H			
Address	Modbus member	Byte 1	MM
Function Code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	R_ADR_H
	Register Address (Low Byte)	Byte 4	R_ADR_L
	Register Amount (High Byte)	Byte 5	R_AMO_H
	Register Amount (Low Byte)	Byte 6	R_AMO_L
CRC	Check sum (Low Byte)	Byte 7	CRC_L
	Check sum (High Byte)	Byte 8	CRC_H

Answer: MM 04h BC R_VAL_H R_VAL_L CRC_L CRC_H			
Address	Modbus member	Byte 1	MM
Function Code	Lese Input Register	Byte 2	04h
Data	Byte Count	Byte 3	BC
	Register value (High Byte)	Byte 4	R_VAL_H
	Register value (Low Byte)	Byte 5	R_VAL_L
CRC	Check sum (Low Byte)	Byte 6	CRC_L
	Check sum (High Byte)	Byte 7	CRC_H

In case of an error only one data byte will be transmitted:

02h: The allowed address range of the Holding Registers D000h – DXXXh (hexadecimal) was exceeded.

03h: An invalid number of registers was read.

05h: An invalid register was accessed (e.g. Motor 7 in a 4 motor system).

0Bh: The GMM controller does not answer, disturbed CAN network.

Read Multiple Input Registers (array)

Command: 04h

With this command it is possible to read some registers as an array.

CAUTION

This command does not correspond to the Modbus specification. It can be used only for the start address of certain data packets. These data arrays can be read only up to the respective array boundary.

Following registers can be read as an array:

D110h – D120h (17 Register)

D131h – D140h (16 Register)

D151h – D160h (16 Register)

D170h – D180h (17 Register)

D171h – D180h (16 Register)

D181h – D190h (16 Register)

D1A9h – D1B8h (16 Register)

In the following example the register D111-D113 will be read:

Command: 01h 04h D1h 11h 00h 03h D9h 32h			
Address	Modbus member	Byte 1	01h
Function Code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	11h
	Register amount (High Byte)	Byte 5	00h
	Register amount (Low Byte)	Byte 6	03h
CRC	Check sum (Low Byte)	Byte 7	D9h
	Check sum (High Byte)	Byte 8	32h

Answer: 01h 04h 06h 00h 12h 00h 12h 00h 12h F8h 98h			
Address	Modbus member	Byte 1	01h
Function Code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	06h
	Register value 1 (High Byte)	Byte 4	00h
	Register value 1 (Low Byte)	Byte 5	12h
	Register value 2 (High Byte)	Byte 6	00h
	Register value 2 (Low Byte)	Byte 7	12h
	Register value 3 (High Byte)	Byte 8	00h
	Register value 3 (Low Byte)	Byte 9	12h
CRC	Check sum (Low Byte)	Byte 10	F8h
	Check sum (High Byte)	Byte 11	98h

Write Single Holding-Register

Command: 06h

With this command it is possible to write data to a holding register.

Command: MM 06h R_ADR_H R_ADR_L R_VAL_H R_VAL_L CRC_L CRC_H			
Address	Modbus member	Byte 1	MM
Function Code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	R_ADR_H
	Register Address (Low Byte)	Byte 4	R_ADR_L
	Register amount (High Byte)	Byte 5	R_VAL_H
	Register amount (Low Byte)	Byte 6	R_VAL_L
CRC	Check sum (Low Byte)	Byte 7	CRC_L
	Check sum (High Byte)	Byte 8	CRC_H

The holding registers will be explained later.

Answer: MM 06h R_ADR_H R_ADR_L R_VAL_H R_VAL_L CRC_L CRC_H			
Address	Modbus member	Byte 1	01h
Function Code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	R_ADR_H
	Register Address (Low Byte)	Byte 4	R_ADR_L
	Register value (High Byte)	Byte 5	R_VAL_H
	Register value (Low Byte)	Byte 6	R_VAL_L
CRC	Check sum (Low Byte)	Byte 7	CRC_L
	Check sum (High Byte)	Byte 8	CRC_H

Exception Codes:

In case of an error only one data byte will be transmitted:

02h: The allowed address range of the Holding Register D000h – DXXXh (hexadecimal) was exceeded

03h: An invalid number of registers was read.

04h: The Holding Register cannot be written because a hardware error occurred

0Bh: The GMM controller does not answer, disturbed CAN network.

REGISTERS

PROGRAMMING HINT

⚠ CAUTION

The Programming of the Modbus communication is done different in the PLC-Programming tools.

The valid address range of the Input or Holding Register is in some cases 0... 65535 and in some cases 1...65536 decimal.

So it can be necessary, that you have to add +1 to the here gives decimal address, if your programming tool only allows decimal values between 1 65536.

The used values here are related to the range 0...65535 decimal in the following of the real hexadecimal value of an unsigned integer value with 16 bits.

Some available registers are represented as fixed-point numbers. In order to transmit a value with decimal places via the CAN or Modbus in a simple manner, this value must be multiplied by a factor prior to transmission. Whether the register that is to be read or written is provided by a factor which is on the respective tab description.

HOLDING REGISTER OVERVIEW

The following table provides an overview of all available Holding Register. These are explained in detail in the following chapters.

Table: Holding Register

Modbus-Address		Function	Register available at:			
Decimal *1)	Hexadecimal		GMM EC	GMM sincon	GMM step	GMM phasecut
Holding Register						
53248	D000h	Control Value	x	x	x	x
53249	D001h	Operating mode	x	x	x	x
53250	D002h	Control parameter Kp1	x	x	x	x
53251	D003h	Control parameter Ti1	x	x	x	x
53252	D004h	Control parameter Td1	x	x	x	x
53253	D005h	Control parameter Kp2 (not yet implemented)				
53254	D006h	Control parameter Ti2 (not yet implemented)				
53255	D007h	Control parameter Td2 (not yet implemented)				
53256	D005h	Switching Control System (not yet implemented)				
53257	D009h	Setpoint 1	x	x	x	x
53258	D00Ah	Setpoint 2	x	x	x	x
53259	D00Bh	Watchdog	x	x	x	x
53260	D00Ch	Used refrigerant	x	x	x	x
53261	D00Dh	Modbus Address	x	x	x	x
53262	D00Eh	Baudrate	x	x	x	x
53263	D00Fh	Parity/Framing	x	x	x	x
53264	D010h	Status manual mode	x ^{*2)}	x ^{*3)}	x ^{*4)}	x ^{*5)}
53265	D011h	Control Value manual mode	x ^{*2)}	x ^{*3)}	x ^{*4)}	x ^{*5)}
53308	D03Ch	Status Threshold value	x ^{*2)}	x ^{*3)}	x ^{*4)}	x ^{*5)}
53266	D012h	Threshold value depending on	x ^{*2)}	x ^{*3)}	x ^{*4)}	x ^{*5)}
53267	D013h	Threshold value limit (% Temp, Pressure)	x ^{*2)}	x ^{*3)}	x ^{*4)}	x ^{*5)}
53268	D014h	threshold value Ambient temperature	x ^{*2)}	x ^{*3)}	x ^{*4)}	x ^{*5)}

Table: Holding Register (continued)

Modbus-Address		Function	Register available at:			
Decimal *1)	Hexadecimal		GMM EC	GMM sincon	GMM step	GMM phasecut
Holding Register						
53269	D015h	Threshold value status emergency value	x ^{*2)}	x ^{*3)}	x ^{*4)}	x ^{*5)}
53270	D016h	Threshold value emergency value	x ^{*2)}	x ^{*3)}	x ^{*4)}	x ^{*5)}
53271	D017h	No. of setpoints	x ^{*2)}	x ^{*3)}	x ^{*4)}	x ^{*5)}
53272	D018h	Nightsetback (Function on/off)	x ^{*2)}	x ^{*3)}		
53273	D019h	Nightsetback threshold value	x ^{*2)}	x ^{*3)}		x ^{*5)}
53274	D01Ah	Manual mode inverse	x ^{*2)}			
53296	D030h	Heat exchanger type	x ^{*2)}	x ^{*3)}	x ^{*4)}	
53376	D080h	Fancy cycling on/off (from GMM step V004)			x	
53377	D081h	Hysteresis off (from GMM step V004)			x	

*1) see also Programming hint, Page 14

*2) only with Hardware GCM MOD GMM EC.1 and GMM EC Firmware from V043 (ERP 5206415)

*3) only with Hardware GCM MOD GMM Rail.2 and GMM sincon Firmware from V007

*4) only with Hardware GCM MOD GMM Rail.2 and GMM step Firmware from V005

*5) only with Hardware GCM MOD GMM Rail.2 and GMM phasecut Firmware from V003

CONTROL VALUE

Address: 53248 (decimal) / D000h (hexadecimal)

Format: 16 bit unsigned

Range: 0-100

With this parameter the control value can be set. The control value is the speed of the fans in the range from 0 – 100%. This parameter will only be processed, if the operating mode 4 (Slave Extern Bus) is used (see Operating mode, Page 18).

Register	GMM Control value															
Address (hex)	D000h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Controls value (0-100)							

Example: a control value of 10% will be programmed to modbus member 1.

Command: 01h 06h D0h 00h 00h 0Ah 31h 0Dh			
Address	Modbus member	Byte 1	01h
Function-Code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	00h
	Register Value (High Byte)	Byte 5	00h
CRC	Register Value (Low Byte)	Byte 6	0Ah
	Check sum (Low Byte)	Byte 7	31h
	Check sum (High Byte)	Byte 8	0Dh

Answer: 01h 06h D0h 00h 00h 0Ah 31h 0Dh			
Address	Modbus member	Byte 1	01h
Functions-Code	WriteSingle Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	00h
	Register Value (High Byte)	Byte 5	00h
	Register Value (Low Byte)	Byte 6	0Ah
CRC	Check sum (Low Byte)	Byte 7	31h
	Check sum (High Byte)	Byte 8	0Dh

OPERATING MODE

Address: 53249 (decimal) / D001h (hexadecimal)

Format: 16 bit unsigned

Range: 0-4

With this parameter the operating mode of the GMM will be programmed. Following operating modes may be used, which can be set in the service menu.

⚠ CAUTION

The manual mode overrides the operating mode.

AUTOMATIC INTERNAL

In this mode the GMM regulates automatically to the setpoint configured in the service menu.

AUTOMATIC EXTERNAL ANALOG

In this mode the GMM regulates automatically to the setpoint defined by the external analog input. The analog input which will be used as the setpoint input is set in the I/O configuration.

Automatic External Bus

In this mode, the setpoint via Modbus is written. In case of communication problems, the GMM will use the last transmitted setpoint. The external setpoint is written to the setpoint-register of the GMM. If the mode is changed in the service menu, the setpoint in the GMM can be changed.

Slave external analogue

In this mode, there is no internal control. Instead the control value on the slave input is scaled and forwarded to the individual spraying steps. Which input is to be used as the slave input is defined in the I/O configuration.

Slave External Bus

In this mode the internal control is deactivated. All param-

eters can be changed, but only the external control value will be used for setting the motor speed.

If the external communication is interrupted, the control will use the programmed setpoint (only if the watchdog is activated).

The following modes are available:

Value	Operating mode
0	Automatic Internal
1	Automatic External analog
2	Automatic External BUS
3	Slave External analog
4	Slave External BUS

Register	GMM Operating mode															
Address (hex)	D001h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Operating mode (0-4)							

Example: Operating mode 2 (Automatic External BUS) will be programmed to modbus member 1.

Command: 01h 06h D0h 00h 00h 0Ah 31h 0Dh			
Address	Modbus member	Byte 1	01h
Function-Code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	01h
	Register value (High Byte)	Byte 5	00h
CRC	Register value (Low Byte)	Byte 6	02h
	Check sum (Low Byte)	Byte 7	61h
	Check sum (High Byte)	Byte 8	0Bh

Answer: 01h 06h D0h 00h 00h 0Ah 31h 0Dh			
Address	Modbus member	Byte 1	01h
Functions-Code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	01h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	02h
CRC	Check sum (Low Byte)	Byte 7	61h
	Check sum (High Byte)	Byte 8	0Bh

CONTROL PARAMETER

Control Parameter Kp1

Address: 53250 (decimal) / D002h (hexadecimal)

Format: 16 bit unsigned

Range: 0-1000

With this register the control parameter Kp1 is programmed which is used by the PID controller. (see Watchdog, Page 28 , for normal and emergency operation).

If the external communication is interrupted, the control will use this value. The value has to be multiplied by 10 for precision purposes.

The default depends on the type of the heat exchanger. The value range is 1 – 1000 (= 0,1 – 100,0)

Register	GMM Control Parameter Kp1															
Address (hex)	D002h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	Control Parameter Kp1 (0-1000)															

Example: The control parameter Kp1 will be set to 12.3 for modbus member 1.

Command: 01h 06h D0h 02h 00h 7Bh 50h E9h			
Address	Modbus member	Byte 1	01h
Functions-Code	WriteSingle Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	02h
	Register value (High Byte)	Byte 5	00h
CRC	Register value (Low Byte)	Byte 6	7Bh
	Check sum (Low Byte)	Byte 7	50h
	Check sum (High Byte)	Byte 8	E9h

Answer:			
Address	Modbus member	Byte 1	01h
Functions-Code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	02h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	02h
CRC	Check sum (Low Byte)	Byte 7	61h
	Check sum (High Byte)	Byte 8	0Bh

Control parameter Td1

Address: 53252 (decimal) / D004h (hexadecimal)

Format: 16 bit unsigned

Value range: 0-1000

This register is used to program control parameter Td1 for the PID controller. (See Watchdog, Page 28 for more information about normal operation and emergency operation). This value is used only in connection with the internal PID controller (differential component). The default value will depend on the type of heat exchanger used. The value Td1 =0 deactivates the "D" component of the PID controller.

The valid range is 0... 1000 (seconds)

Register	GMM control parameter Td1															
Address (hex)	D004h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	Control parameter Td1 (0-1000)															

Example: The control parameter is set to 5 for Modbus subscriber 1.

Command: 01h 06h D0h 04h 00h 05h 30h C8h			
Address	Modbus subscriber	Byte 1	01h
Function code	Write single register	Byte 2	06h
Data	Register address (high byte)	Byte 3	D0h
	Register address (low byte)	Byte 4	04h
	Register value (high byte)	Byte 5	00h
	Register value (low byte)	Byte 6	05h
CRC	Checksum (low byte)	Byte 7	30h
	Checksum (high byte)	Byte 8	C8h

Answer: 01h 06h D0h 04h 00h 05h 30h C8h			
Address	Modbus subscriber	Byte 1	01h
Function code	Write single register	Byte 2	06h
Data	Register address (high byte)	Byte 3	D0h
	Register address (low byte)	Byte 4	04h
	Register value (high byte)	Byte 5	00h
	Register value (low byte)	Byte 6	05h
CRC	Checksum (low byte)	Byte 7	30h
	Checksum (high byte)	Byte 8	C8h

Data

The length of the data bytes and its function depends on the transmitted command. (see Data Bytes, Page 10)

CRC Low / CRC High:

The checksum CRC will be generated over the full message.

The check sum is calculated as described in Command from Master, Page 8.

Control Parameter Ti1

Address: 53251 (decimal) / D003h (hexadecimal)

Format: 16 bit unsigned

Range: 0-1000

With this register the control parameter Ti1 is programmed which is used by the PID controller. (see Watchdog, Page 28, for normal and emergency operation).

The default depends on the type of the heat exchanger. Setting the value to Ti1 = 0 will deactivate the "I" component.

The range is 0... 1000 (seconds)

Register	GMM Control Parameter Ti1															
Address (hex)	D003h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	Control Parameter Ti1 (0-1000)															

Example: The control parameter will be set to 5 for modbus member 1.

Command: 01h 06h D0h 03h 00h 7Bh 81h E9h			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	03h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	7Bh
CRC	Check sum (Low Byte)	Byte 7	81h
	Check sum (High Byte)	Byte 8	E9h

Answer: 01h 06h D0h 03h 00h 02h 81h E9h			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	03h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	02h
CRC	Check sum (Low Byte)	Byte 7	81h
	Check sum (High Byte)	Byte 8	E9h

Control Parameter Kp2

(not yet implemented)

Address: D005h (hexadecimal)

Control Parameter Td2

(not yet implemented)

Address: D007h (hexadecimal)

Control Parameter Ti2

(not yet implemented)

Address: D006h (hexadecimal)

Switching Control System

(not yet implemented)

Address: D008h (hexadecimal)

SETPOINT

Setpoint 1

Address: 53257 (decimal) / D009h (hexadecimal)

Format: 16 bit unsigned

Range: 0-1000

With this register the setpoint 1 will be programmed, which is used for the internal regulation of the GMM. The interpretation of this value can be set in the service menu (pressure or temperature). Following data ranges are permitted:

Pressure: 1.0 .. 50.0 bar (only if the used refrigerant is set to "bar")

Temperature: 0.0 .. 100.0°C

The value has to be multiplied by 10 for precision purposes.

Register	GMM Setpoint 1															
Address (hex)	D009h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	Setpoint 1 (0-1000)															

Example: A setpoint of 22.4 °C is written in the GMM with modbus address 1.

If refrigerant is set to "bar", it is interpreted as 22.4 bar

Command: 01h 06h D0h 09h 00h E0h 60h 80h			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	09h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	E0h
CRC	Check sum (Low Byte)	Byte 7	60h
	Check sum (High Byte)	Byte 8	80h

Answer: 01h 06h D0h 09h 00h E0h 60h 80h			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	09h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	E0h
CRC	Check sum (Low Byte)	Byte 7	60h
	Check sum (High Byte)	Byte 8	80h

Setpoint 2

Address: 53258 (decimal) / D00Ah (hexadecimal)

Format: 16 bit unsigned

Range: 0-1000

With this register the setpoint 2 will be programmed, which is used for the internal control of the GMM. The interpretation of this value can be set in the service menu (pressure or temperature). Following data ranges are allowed:

Pressure: 1.0 .. 50.0 bar (only if the used refrigerant is set to "bar")

Temperature: 0.0 .. 100.0°C

The value has to be multiplied by 10 for precision purposes.

Register	GMM Setpoint 2															
Address (hex)	D00Ah															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	Setpoint 2 (0-1000)															

Example: A setpoint of 22.4 °C is written in the GMM with modbus address 1. If refrigerant is "bar" it is interpreted as 22.4 bar.

Command: 01h 06h D0h 0Ah 00h E0h 90h 80h			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	0Ah
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	E0h
CRC	Check sum (Low Byte)	Byte 7	90h
	Check sum (High Byte)	Byte 8	80h

Answer: 01h 06h D0h 0Ah 00h E0h 90h 80h			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	0Ah
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	E0h
CRC	Check sum (Low Byte)	Byte 7	90h
	Check sum (High Byte)	Byte 8	80h

WATCHDOG

Address: 53259 (decimal) / D00Bh (hexadecimal)

Format: 16 bit unsigned

Range: 0-250 [s]

With this parameter it is possible to program the watchdog time. If the Modbus communication is interrupted, then after the Watchdog time the internal PID controller will take over control. The time will be counted in seconds after the reception of the last modbus message. The value 0 deactivates the watchdog. This parameter is only configurable via Modbus and not in the service menu.

Register	GMM Watchdog															
Address (hex)	D00Bh															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Watchdog (0-250)							

Example: The watchdog time will be set to 10s for modbus member 1.

Command: 01h 06h D0h 0Bh 00h 0Ah 40h CFh			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	0Bh
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	0Ah
CRC	Check sum (Low Byte)	Byte 7	40h
	Check sum (High Byte)	Byte 8	CFh

Answer: 01h 06h D0h 0Bh 00h 0Ah 40h CFh			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	0Bh
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	0Ah
CRC	Check sum (Low Byte)	Byte 7	40h
	Check sum (High Byte)	Byte 8	CFh

REFRIGERANT

Address: 53260 (decimal) / D00Ch (hexadecimal)

Format: 16 bit unsigned

Range: 0-10

This parameter sets the refrigerant which is used in the heat exchanger. The characteristic curve of the used refrigerant is saved in the GMM. Therefore, it is possible to make a conversion between pressure and temperature.

The following refrigerant are available:

Value	Refrigerant	Value	Refrigerant
0	bar (no refrigerant)	6	R507
1	R134a	7	R717 (NH ₃)
2	R290	8	R723
3	R404A	9	R744 (CO ₂)
4	R407C	10	R22
5	R410A		

Register	GMM Watchdog															
Address (hex)	D00Ch															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Refrigerant (0-10)							

Example: The refrigerant R507 is used for the conversion for modbus member 1:

Command: 01h 06h D0h 0Ch 00h 06h F1h 0Bh			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	0Ch
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	06h
CRC	Check sum (Low Byte)	Byte 7	F1h
	Check sum (High Byte)	Byte 8	0Bh

Answer: 01h 06h D0h 0Ch 00h 06h F1h 0Bh			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	0Ch
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	06h
CRC	Check sum (Low Byte)	Byte 7	F1h
	Check sum (High Byte)	Byte 8	0Bh

MODBUS ADDRESS

Address: 53261 (decimal) / D00Dh (hexadecimal)

Format: 16 bit unsigned

Range: 1-247

This parameter sets the modbus address the GMM is using. After setting the new address it is necessary to reset the GMM (Power OFF/ON).

Register	GMM Modbus Address															
Address (hex)	D00Dh															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Modbus Address (1-247)							

Example: The modbus address will be set to 2 for modbus member 1.

Command: 01h 06h D0h 0Dh 00h 02h A1h 08h			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	0Dh
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	02h
CRC	Check sum (Low Byte)	Byte 7	A1h
	Check sum (High Byte)	Byte 8	08h

Answer: 01h 06h D0h 0Dh 00h 02h A1h 08h			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	0Dh
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	02h
CRC	Check sum (Low Byte)	Byte 7	A1h
	Check sum (High Byte)	Byte 8	08h

MODBUS BAUDRATE

Address: 53262 (decimal) / D00Eh (hexadecimal)

Format: 16 bit unsigned

Range: 0-8

This parameter sets the modbus baudrate.

Value	Baudrate [bit/s]	Value	Baudrate [bit/s]
0	1200	5	34800
1	2400	6	57600
2	4800	7	76800
3	9600 (default)	8	115200
4	19200		

Register	GMM Modbus Baudrate															
Address (hex)	D00E															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Modbus Baudrate (0-8)							

Example: The modbus baudrate will be set to 19200 bit/s for modbus member 1.

Command: 01h 06h D0h 0Eh 00h 02h D1h 0Ah			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	0Eh
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	04h
CRC	Check sum (Low Byte)	Byte 7	D1h
	Check sum (High Byte)	Byte 8	0Ah

Answer: 01h 06h D0h 0Eh 00h 02h D1h 0Ah			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	0Eh
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	04h
CRC	Check sum (Low Byte)	Byte 7	D1h
	Check sum (High Byte)	Byte 8	0Ah

MODBUS PARITY/FRAMING

Address: 53263 (decimal) / D00Fh (hexadecimal)

Format: 16 bit unsigned

Range: 0-3

This parameter sets the parity and framing. The following values are valid:

Value	Parity/Framing	Description
0	8,E,1	8 Data Bits, even parity, 1 Stop Bit
1	8,N,1 (default)	8 Data Bits, no parity, 1 Stop Bit
2	8,N,2	8 Data Bits, no parity, 2 Stop bit
3	8,O,1	8 Data Bits, odd parity, 1 Stop bit

Register	GMM Modbus Parity/Framing															
Address (hex)	D00F															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Modbus Parity/Framing Selector							

Example: The modbus baudrate will be set to 19200 bit/s for modbus member 1.

Command: 01h 06h D0h 0Fh 00h 01h 40h C4h			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	0Fh
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	40h
	Check sum (High Byte)	Byte 8	C4h

Answer: 01h 06h D0h 0Fh 00h 01h 40h C4h			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	0Fh
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	40h
	Check sum (High Byte)	Byte 8	C4h

STATUS MANUAL MODE

Address: 53264 (decimal) / D010h (hexadecimal)

Format: 16 bit unsigned

Range: 0-1

Setting this register to the value "1" activates the manual mode. If the manual mode is active, it is possible via the register "control value manual mode" the control value of the controller to set in the range from 0% to 100%. After writing this register with a 0, the manual mode is deactivated.

Register	Status manual mode															
Address (hex)	D010h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Status manual mode (0-1)							

Example: the manual mode is activated.

Command: 01h 06h D0h 10h 00h 01h 71h 0Fh			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	10h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	71h
	Check sum (High Byte)	Byte 8	0Fh

Answer: 01h 06h D0h 10h 00h 01h 71h 0Fh			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	10h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	71h
	Check sum (High Byte)	Byte 8	0Fh

CONTROL VALUE MANUAL MODE

Address: 53265 (decimal) / D011h (hexadecimal)

Format: 16 bit unsigned

Range: 0-100 [%]

This register indicates which control value the GMM controller displayed when the manual mode is active.

Register	Control value Manual mode															
Address (hex)	D011h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Control value Manual mode (0-100)							

Example: A control value of 10% is passed to the GMM controller.

Command: 01h 06h D0h 11h 00h 0Ah 61h 08h			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	11h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	0Ah
CRC	Check sum (Low Byte)	Byte 7	61h
	Check sum (High Byte)	Byte 8	08h

Answer: 01h 06h D0h 11h 00h 0Ah 61h 08h			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	11h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	0Ah
CRC	Check sum (Low Byte)	Byte 7	61h
	Check sum (High Byte)	Byte 8	08h

STATUS THRESHOLD VALUE

Address: 53308 (decimal) / D03Ch (hexadecimal)

Format: 16 bit unsigned

Range: 0-1

With this register the threshold value function can be activated. A "1" activates the function. A "0" deactivated it again.

Register	Status Threshold value															
Address (hex)	D03Ch															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Status Threshold value (0-1)							

Example: The threshold value function is activated.

Command: 01h 06h D0h 3Ch 00h 01h B0h C6h			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	3Ch
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	B0h
	Check sum (High Byte)	Byte 8	C6h

Answer: 01h 06h D0h 3Ch 00h 01h B0h C6h			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	3Ch
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check Sum (Low Byte)	Byte 7	B0h
	Check sum (High Byte)	Byte 8	C6h

THRESHOLD VALUE DEPENDING ON

Address: 53266 (decimal) / D012h (hexadecimal)

Format: 16 bit unsigned

Range: see table

With the help of the threshold function, it is possible to switch the threshold value relay (digital output DO4, contact 41/44) in dependence on different parameters. With this register there is the possibility to configure the dependence of the threshold value function. The following table gives an overview of the possible threshold value dependencies.

Value	Dependence	Value	Dependence
0	Control value	3	Control value and ambient temperature
1	Actual value	4	Actual value and ambient temperature
2	Ambient temperature		

Register	Threshold value depending on															
Address (hex)	D012h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Threshold value depending on (0-4)							

Example: Threshold value depending on the control value and outside temperature.

Command: 01h 06h D0h 12h 00h 03h 51h 0Eh			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	12h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	03h
CRC	Check sum (Low Byte)	Byte 7	51h
	Check sum (High Byte)	Byte 8	0Eh

Answer: 01h 06h D0h 12h 00h 03h 51h 0Eh			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	12h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	03h
CRC	Check sum (Low Byte)	Byte 7	51h
	Check sum (High Byte)	Byte 8	0Eh

THRESHOLD VALUE LIMIT

Address: 53267 (decimal) / D013h (hexadecimal)

Format: 16 bit unsigned

Range: see table

With this register the limit of the threshold function can be set. If the limit is exceeded threshold value function is activated. The value is multiplied for accuracy reasons by 10.

Range	Limit of
0-100 [%]	Control value
-30 bis +100 [°C]	Actual value
0-100 [%]	Control value and ambient temperature
-30 bis +100 [°C]	Actual value and ambient temperature

Register	Threshold value limit															
Address (hex)	D013h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	Threshold value limit *10															

Example: The threshold is depending on ambient temperature. The limit is programmed to -20 ° C.

Command: 01h 06h D0h 13h FFh 38h 00h EDh			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	13h
	Register value (High Byte)	Byte 5	FFh
	Register value (Low Byte)	Byte 6	38h
CRC	Check sum (Low Byte)	Byte 7	00h
	Check sum (High Byte)	Byte 8	EDh

Answer: 01h 06h D0h 13h FFh 38h 00h EDh			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	13h
	Register value (High Byte)	Byte 5	FFh
	Register value (Low Byte)	Byte 6	38h
CRC	Check sum (Low Byte)	Byte 7	00h
	Check sum (High Byte)	Byte 8	EDh

THRESHOLD VALUE AMBIENT TEMPERATURE

Address: 53268 (decimal) / D014h (hexadecimal)

Format: 16 bit unsigned

Range: -30 bis +100 [°C]

With this register the ambient temperature of the threshold function can be set. If the limit is exceeded threshold value function is activated. The value is multiplied for accuracy reasons by 10.

Register	Threshold value ambient temperature															
Address (hex)	D014h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	Threshold value ambient temperature (-30;+100) * 10															

Example: The ambient temperature threshold is programmed to 25 ° C.

Command: 01h 06h D0h 14h 00h FAh 71h 4Dh			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	14h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	FAh
CRC	Check sum (Low Byte)	Byte 7	71H
	Check sum (High Byte)	Byte 8	4Dh

Answer: 01h 06h D0h 14h 00h FAh 71h 4Dh			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	14h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	FAh
CRC	Check sum (Low Byte)	Byte 7	71h
	Check sum (High Byte)	Byte 8	4Dh

THRESHOLD VALUE EMERGENCY VALUE STATUS

Address: 53269 (decimal) / D015h (hexadecimal)

Format: 16 bit unsigned

Range: 0-1

With this register the emergency value function can be activated. A "1" activates the function. A "0" deactivate it again.

Register	Threshold value emergency value Status															
Address (hex)	D015h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Threshold value emergency value Status							

Example: The emergency value function is activated.

Command: 01h 06h D0h 15h 00h 01h 61h 0Eh			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	15h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	61H
	Check sum (High Byte)	Byte 8	0Eh

Answer: 01h 06h D0h 15h 00h 01h 61h 0Eh			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	15h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	61h
	Check sum (High Byte)	Byte 8	0Eh

THRESHOLD VALUE/EMERGENCY CONTROL VALUE

Address: 53270 (decimal) / D016h (hexadecimal)

Format: 16 bit unsigned

Value range: 0-100 [%]

This register can be used to program the emergency control value.

The emergency control value is output as control value when the following conditions are satisfied:

- Threshold value function is active
- Threshold value condition(s) exceeded
- Emergency control value function is active
- Emergency control value is greater than its calculated control value (e.g. with control operation or bypass value with sensor fault)
- Manual mode is not active
- External enable is provided, if appropriate the emergency control value may be reduced to an active night limit.

Register	Threshold value/emergency control value															
Address (hex)	D016h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Threshold for emergency control value (0-100)							

Example: An emergency control value is programmed as 10%.

Command: 01h 06h D0h 16h 00h 0Ah D0h C9h			
Address	Modbus subscriber	Byte 1	01h
Function code	Write single register	Byte 2	06h
Data	Register address (high byte)	Byte 3	D0h
	Register address (low byte)	Byte 4	16h
	Register value (high byte)	Byte 5	00h
	Register value (low byte)	Byte 6	0Ah
CRC	Checksum (low byte)	Byte 7	D0h
	Checksum (high byte)	Byte 8	C9h

Answer: 01h 06h D0h 16h 00h 0Ah D0h C9h			
Address	Modbus subscriber	Byte 1	01h
Function code	Write single register	Byte 2	06h
Data	Register address (high byte)	Byte 3	D0h
	Register address (low byte)	Byte 4	16h
	Register value (high byte)	Byte 5	00h
	Register value (low byte)	Byte 6	0Ah
CRC	Checksum (low byte)	Byte 7	D0h
	Checksum (high byte)	Byte 8	C9h

NUMBER OF SETPOINTS

Address: 53271 (decimal) / D017h (hexadecimal)

Format: 16 bit unsigned

Value range: 1-2

This register is used to specify the number of setpoints. The minimum number is 1 setpoint on which control is performed. If two control values are selected, they are switched over via digital input D2 or D3. If the input is open, setpoint 1 is used for control.

Register	Number of setpoints															
Address (hex)	D017h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Number of setpoints = 1-2.							

Example: The number of setpoints is set to 2.

Command: 01h 06h D0h 17h 00h 02h 80h CFh			
Address	Modbus subscriber	Byte 1	01h
Function code	Write single register	Byte 2	06h
Data	Register address (high byte)	Byte 3	D0h
	Register address (low byte)	Byte 4	17h
	Register value (high byte)	Byte 5	00h
	Register value (low byte)	Byte 6	02h
CRC	Checksum (low byte)	Byte 7	80h
	Checksum (high byte)	Byte 8	CFh

Answer: 01h 06h D0h 17h 00h 02h 80h CFh			
Address	Modbus subscriber	Byte 1	01h
Function code	Write single register	Byte 2	06h
Data	Register address (high byte)	Byte 3	D0h
	Register address (low byte)	Byte 4	17h
	Register value (high byte)	Byte 5	00h
	Register value (low byte)	Byte 6	02h
CRC	Checksum (low byte)	Byte 7	80h
	Checksum (high byte)	Byte 8	CFh

STATUS NIGHTSETBACK

Address: 53272 (decimal) / D018h (hexadecimal)

Format: 16 bit unsigned

Range: 0-1

With this register the nightsetback function can be activated. A "1" activates the function. A "0" deactivate it again.

Register	Status nightsetback															
Address (hex)	D018h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Status nightsetback (0-1)							

Example: The nightsetback is activated.

Command: 01h 06h D0h 18h 00h 01h F0h CDh			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	18h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	F0h
	Check sum (High Byte)	Byte 8	CDh

Answer: 01h 06h D0h 18h 00h 01h F0h CDh			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	18h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	F0h
	Check sum (High Byte)	Byte 8	CDh

NIGHTSETBACK LIMIT

Address: 53273 (decimal) / D019h (hexadecimal)

Format: 16 bit unsigned

Range: 0-100 [%]

About the Programming of this register the limit of the nightsetback is set.

Register	Nightsetback limit															
Address (hex)	D019h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Nightsetback limit (0-100)							

Example: The limit of the nightsetback is set at 70%.

Command: 01h 06h D0h 19h 00h 46h E1h 3Fh			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	19h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	46h
CRC	Check sum (Low Byte)	Byte 7	E1h
	Check sum (High Byte)	Byte 8	3Fh

Answer: 01h 06h D0h 19h 00h 46h E1h 3Fh			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	19h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	46h
CRC	Check sum (Low Byte)	Byte 7	E1h
	Check sum (High Byte)	Byte 8	3Fh

MANUAL INVERSE OPERATION

Address: 53274 (decimal) / D01Ah (hexadecimal)

Format: 16 bit unsigned

Value range: 0-1

While manual operation is active it is possible to cycle the fans in the opposite direction to their preferred direction. You can program this register to turn this function on (1) or off (0).

Register	Manual inverse operation															
Address (hex)	D01Ah															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Manual inverse operation (0-1)							

Example: The function "manual inverse operation" is to be activated.

Command: 01h 06h D0h 1Ah 00h 01h 51h 0Dh			
Address	Modbus subscriber	Byte 1	01h
Function code	Write single register	Byte 2	06h
Data	Register address (high byte)	Byte 3	D0h
	Register address (low byte)	Byte 4	1Ah
	Register value (high byte)	Byte 5	00h
	Register value (low byte)	Byte 6	01h
CRC	Checksum (low byte)	Byte 7	51h
	Checksum (high byte)	Byte 8	0Dh

Answer: 01h 06h D0h 1Ah 00h 01h 51h 0Dh			
Address	Modbus subscriber	Byte 1	01h
Function code	Write single register	Byte 2	06h
Data	Register address (high byte)	Byte 3	D0h
	Register address (low byte)	Byte 4	1Ah
	Register value (high byte)	Byte 5	00h
	Register value (low byte)	Byte 6	01h
CRC	Checksum (low byte)	Byte 7	51h
	Checksum (high byte)	Byte 8	0Dh

HEAT EXCHANGER TYPE

Address: 53296 (decimal) / D030h (hexadecimal)

Format: 16 bit unsigned

Range: see following table

About the Programming of this register, the heat exchanger type is adjusted.

Value	Heat exchanger type
00h	Condenser
02h	Dry cooler
04h	Jaeggi-cooler
05h	Evaporator(only GMM sincon and GMM step)

Register	Heat exchanger type															
Address (hex)	D01Ah															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Heat exchanger type (siehe Tabelle)							

Example: as a heat exchanger the dry cooler is set.

Command: 01h 06h D0h 30h 00h 02h 30h C4h			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	30h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	02h
CRC	Check sum (Low Byte)	Byte 7	30h
	Check sum (High Byte)	Byte 8	C4h

Answer: 01h 06h D0h 30h 00h 02h 30h C4h			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	30h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	02h
CRC	Check sum (Low Byte)	Byte 7	30h
	Check sum (High Byte)	Byte 8	C4h

FANCYCLING ON/OFF

Only available at GMM step (minimum firmware version V004a/b)!

Address: 53376 (decimal) / D080h (hexadecimal)

Format: 16 bit unsigned

Range: 0-1

With this parameter, the function fancyclinging can be switched ON or OFF

Register	Fancyclinging															
Address (hex)	D080															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Fancyclinging ON = 1, OFF = 0							

Example: The Fancyclinging will be switched on for member 1.

Command: 01h 06h D0h 80h 00h 02h 71h 22h			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	80h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	71h
	Check sum (High Byte)	Byte 8	22h

Answer: 01h 06h D0h 80h 00h 02h 71h 22h			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	80h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	71h
	Check sum (High Byte)	Byte 8	22h

HYSTERESIS OFF

Only available at GMM step (minimum firmware version V004a/b)!

Address: 53377 (decimal) / D081h (hexadecimal)

Format: 16 bit unsigned

Range: 1-50%

With this parameter, the Hysteresis OFF (switch off from higher step to lower step) can be programmed.

Register	Hysteresis OFF															
Address (hex)	D081															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Value Hysteresis OFF							

Example: The Hysteresis will be set to 10 % on for member 1.

Command: 01h 06h D0h 81h 00h 0Ah 61h 25h			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	81h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	0Ah
CRC	Check sum (Low Byte)	Byte 7	61h
	Check sum (High Byte)	Byte 8	25h

Answer: 01h 06h D0h 81h 00h 0Ah 61h 25h			
Address	Modbus member	Byte 1	01h
Function code	Write Single Register	Byte 2	06h
Data	Register Address (High Byte)	Byte 3	D0h
	Register Address (Low Byte)	Byte 4	81h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	0Ah
CRC	Check sum (Low Byte)	Byte 7	61h
	Check sum (High Byte)	Byte 8	25h

INPUT REGISTER OVERVIEW

Table: Input Register

Modbus-Address		Function	Register available at:			
Decimal *1)	Hexadecimal		GMM EC	GMM sincon	GMM step	GMM phasecut
Input Register						
53504	D100h	Number of motors, steps, VFD's, output stage	x	x	x	x
53505	D101h	Status of the digital inputs of the GMM EC	x	x	x	x
53506	D102h	Function current input AI1	x	x	x	x
53507	D103h	Raw Value AI1	x	x	x	x
53508	D104h	Scaled value AI1 (depending on refrigerant)	x	x	x	x
53509	D105h	Function current input AI2	x	x	x	x
53510	D106h	Scaled value AI2	x	x	x	x
53511	D107h	Scaled value AI2 (depending on refrigerant)	x	x	x	x
53512	D108h	Function Resistor Input AI3	x	x	x	x
53513	D109h	Scaled value AI3	x	x	x	x
53514	D10Ah	Function Voltage Input AI4	x	x	x	x
53515	D10Bh	Raw value / Voltage input AI4	x	x	x	x
53516	D10Ch	Scaled value AI4	x	x	x	x
53517	D10Dh	Status manual mode	x	x	x	x
53518	D10Eh	Control value manual mode	x	x	x	x
53519	D10Fh	Type of motorcontrol	x	x	x	x
53520..53529	D110h..D119h	Current Energie Consumption of one or all VFD		x		
53520..53536	D110h..D120h	Current Energie Consumption of one Motor or in total	x			
53553..53568	D131h..D140h	Motor temperature	x			
53569..53573	D141h..D145h	Heatsink temperature		x		
53585..53600	D151h..D160h	Current fanspeed (in U/min)	x			
53616	D170h	Errors / Alerts of the GMM	x	x	x	x
53617..53632	D171h..D180h	Errors / Alerts of EC Motor	x			
53633..53648	D181h..D190h	Current Fanspeed as percentage of the maximum speed	x			
53664..53672	D1A0h..D1A8	Errors / Alerts / IO-state of VFD		x		
53673..53688	D1A9h- D1B8h	Operating hours per fan	x *2)			
53760	D200h	Current air volume as percentage of the maximum air volume	x	x	x	x
53761	D201h	Status of digital outputs of GMM	x	x	x	x
53762	D202h	Status of the steps of step controller			x	
53763	D203h	Number of error message			x	
53764	D204h	Status of digital outputs of GIOD			x	
53765	D205h	Status of digital inputs of GIOD			x	
53766	D206h	Status info GMM	x *2)	x *3)	x *4)	x *5)

*1) see also Programming hint, Page 14

*2) only with hardware GCM MOD GMM EC.1 and GMM EC firmware from V043 (ERP 5206415)

*3) only with hardware GCM MOD GMM Rail.2 and GMM sincon firmware from V007

*4) only with hardware GCM MOD GMM Rail.2 and GMM step firmware from V005

*5) only with hardware GCM MOD GMM Rail.2 and GMM phasecut firmware from V003

NUMBER OF MOTORS, STEPS, VFD'S, OUTPUT STAGE

Address: 53504 (decimal) / D100h (hexadecimal)

Format: 16 bit unsigned

Range: 0-16 (GMM EC)

1-9 (GMM sincon, GMM step, GMM phasecut)

This register contains, depending on the controller type the following contents:

- the number of fans (EC motors) used in the GMM EC
- the number of VFD's used in GMM sincon
- the number of steps used in GMM step
- the number of phasecut units used in GMM phasecut

The type of Motor-Control can be read from Input Register: "Type of Motorcontrol"

Register	GMM number of motors															
Address (hex)	D100h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Number of motors 0-16)							

Example: The number of motors will be read from modbus member 1.

Command: : 01h 04h D1h 00h 00h 01h 71h 36h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	00h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	08h
	Check sum (High Byte)	Byte 8	F6h

Answer: 01h 04h 02h 00h 08h B8h F6h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	00h
	Register value (Low Byte)	Byte 5	08h
CRC	Check sum (Low Byte)	Byte 6	B8h
	Check sum (High Byte)	Byte 7	F6h

The GMM has 8 motors.

STATUS OF THE DIGITAL INPUTS OF THE GMM EC

Address: 53505 (decimal) / D101h (hexadecimal)

Format: 16 bit unsigned

Range: 0-7

This register contains the status (low or high) of the three digital inputs of the GMM. A 1 means high level, a 0 means low level.

Register	GMM status of the digital inputs															
Address (hex)	D101h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	k.f	k.f	k.f	k.f	k.f	k.f	k.f	k.f	k.f	k.f	k.f	k.f	k.f	DI3	DI2	DI1

DI1..DI3 : Digital inputs of the GMM EC

Example: The status of the digital inputs will be read from modbus member 1.

GMM Inputs	k.f	k.f	k.f	k.f	k.f	k.f	k.f	k.f	k.f	k.f	k.f	k.f	k.f	k.f	DI3	DI2	DI1
con- nected (High)															x		x
not con- nected (Low)																x	

Register	GMM status of the digital inputs															
Address (hex)	D101h															
Status Inputs (bin)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Status Inputs (bin)	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Status Inputs (hex)	0				0				0				0			

The GMM has 8 motors.

Command: 01h 04h D1h 01h 00h 01h 59h 36h			
Address	Modbus member	Byte 1	01h
Function code	Lese Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	01h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	59h
	Check sum (High Byte)	Byte 8	36h

Answer: 01h 04h 02h 00h 05h 79h 33h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	00h
	Register value (Low Byte)	Byte 5	05h
CRC	Check sum (Low Byte)	Byte 6	79h
	Check sum (High Byte)	Byte 7	33h

FUNCTION CURRENT INPUT AI1

Address: 53506 (decimal) / D102h (hexadecimal)

Format: 16 bit unsigned

Range: 0-7

This register contains the value which represents the function of the current input AI1. This function can be set in the service menu.

Register	GMM function current input															
Address (hex)	D102h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Function current input (0-7)							

Value	Function	Value	Function
0	no function	3	Setpoint 1
1	Actual value 0..25 bar	4	Setpoint 2
2	Control value slave	7	Actual value 0..40 bar

In this example the current input AI1 will be read from modbus member 1.

Command: 01h 04h D1h 02h 00h 01h A9h 36h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	02h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	A9h
	Check sum (High Byte)	Byte 8	36h

Answer: 01h 04h 02h 00h 08h B8h F6h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	00h
	Register value (Low Byte)	Byte 5	02h
CRC	Check sum (Low Byte)	Byte 6	38h
	Check sum (High Byte)	Byte 7	F1h

In this example the modbus member 1 has defined the function "Control value slave" for the current input AI1.

RAW VALUE AI1

Address: 53507 (decimal) / D103h (hexadecimal)

Format: 16 bit unsigned

Range: 0-230

This register contains the raw value of the analog input AI1 . The analog input has a value range of 0..23mA. The value is multiplied by 10 for precision purposes.

Register	GMM raw value AI1															
Address (hex)	D103h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Raw value AI1 (0-230, multiplied with 10)							

Example: The raw value AI1 will be read from modbus member 1.

Command: 01h 04h D1h 03h 00h 01h F8h F6h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	03h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	F8h
	Check sum (High Byte)	Byte 8	F6h

Answer: 01h 04h 02h 00h 85h 78h 93h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	00h
	Register value (Low Byte)	Byte 5	85h
CRC	Check sum (Low Byte)	Byte 6	78h
	Check sum (High Byte)	Byte 7	93h

In this example the input current at AI1 is 13.3mA.

SCALED VALUE AI1

(depending on refrigerant)

Address: 53508 (decimal) / D104h (hexadecimal)

Format: 16 bit signed

Range: -500 - 1000

This register contains the value of the analog input AI1. The interpretation of this value is controlled by the settings in the service menu.

The value range is as follows:

Pressure: 1.0 .. 50.0 bar (only if the used refrigerant is set to "bar")

Temperature: -50.0 .. 100.0°C

The value is multiplied by 10 for precision purposes.

Register	GMM scaled value AI1															
Address (hex)	D104h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	Scaled value AI1 (-500 - 1000)															

Example: The scaled value AI1 will be read from modbus member 1.

Command: 01h 04h D1h 04 00h 01h 49h 37h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	04h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	49h
	Check sum (High Byte)	Byte 8	37h

Answer: 01h 04h 02h 01h 85h 79h 03h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	01h
	Register value (Low Byte)	Byte 5	85h
CRC	Check sum (Low Byte)	Byte 6	79h
	Check sum (High Byte)	Byte 7	03h

In this example the temperature is 38.9°C.

**FUNCTION CURRENT INPUT AI2
 (4..20 mA / KTY)**

Address: 53509 (decimal) / D105h (hexadecimal)

Format: 16 bit unsigned

Range: 0-9

This register contains the value which represents the function of the current input AI2. This function can be set in the service menu.

Register	GMM function current input AI2															
Address (hex)	D105h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Function current input AI2 (0-9)							

Value	Function	Value	Function
0	no function	5	Ambient temperature -50..+50 °C [4..20 mA]
1	Actual value 0..25 bar [4..20 mA]	7	Actual value 0..40 bar [4..20 mA]
2	Control value slave [4..20 mA]	8	Actual value Temp -30..+70 °C [4..20 mA]
3	Setpoint 1 [4..20 mA]	9	Actual value GTF210 [KTY]
4	Setpoint 2 [4..20 mA]		

In this example the current input AI2 will be read from modbus member 1.

Command: 01h 04h D1h 05h 00h 01h 92h B1h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	05h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	92h
	Check sum (High Byte)	Byte 8	B1h

Answer: 01h 04h 02h 00h 02h 38h F1h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	00h
	Register value (Low Byte)	Byte 5	02h
CRC	Check sum (Low Byte)	Byte 6	38h
	Check sum (High Byte)	Byte 7	F1h

In this example the temperature is 38.9°C.

SCALED VALUE AI1

Address: 53510 (decimal) / D106h (hexadecimal)

Format: 16 bit unsigned

Range: 0-230

This register contains the raw value of the analog input AI2 of the GMM. The analog input has a value range of 0..23mA. The value is multiplied by 10 for precision purposes.

Register	GMM raw value AI2															
Address (hex)	D106h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Raw value AI2 (0-230)							

Example: In this example the raw value of the current input AI2 will be read from the modbus member 1.

Command: 01h 04h D1h 06h 00h 01h E8h F7h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	06h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	E8h
	Check sum (High Byte)	Byte 8	F7h

Answer: 01h 04h 02h 00h 85h 78h 93h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	00h
	Register value (Low Byte)	Byte 5	85h
CRC	Check sum (Low Byte)	Byte 6	78h
	Check sum (High Byte)	Byte 7	93h

In this example the input current at AI2 is 13.3mA

SCALED VALUE AI2

(depending on refrigerant)

Address: 53511 (decimal) / D107h (hexadecimal)

Format: 16 bit signed

Range: -500 - 1000

This register contains the scaled value of the analog input AI2. The interpretation of this value is controlled by the settings in the service menu.

The value range is as follows:

Pressure: 1.0 .. 50.0 bar (only if the used refrigerant is set to "bar")

Temperature: -50.0 .. 100.0°C

The value is multiplied by 10 for precision purposes.

Register	GMM scaled value AI2															
Address (hex)	D107h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	Scaled value AI2 (-500 - 1000)															

In this example the scaled value of the current input AI2 will be read from the modbus member 1.

Command: 01h 04h D1h 07h 00h 01h B9h 37h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	07h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	B9h
	Check sum (High Byte)	Byte 8	37h

Answer: 01h 04h 02h 01h 85h 79h 03h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	01h
	Register value (Low Byte)	Byte 5	85h
CRC	Check sum (Low Byte)	Byte 6	79h
	Check sum (High Byte)	Byte 7	03h

In this example the temperature is 38.9°C.

FUNCTION RESISTOR INPUT AI3

Address: 53512 (decimal) / D108h (hexadecimal)

Format: 16 bit unsigned

Range: 0-9

This register contains the value which represents the function of the analog input AI3. This function can be changed in the service menu of the GMM.

Register	GMM Function Resistor Input AI3															
Address (hex)	D108h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Function Resistor Input AI3 (0-9)							

Value	Function
0	no function
5	Ambient temperature
9	Actual value GTF210

In this example the function of the resistance input AI3 will be read from the modbus member 1.

Command: 01h 04h D1h 08h 00h 01h 89h 34h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	08h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	89h
	Check sum (High Byte)	Byte 8	34h

Answer: 01h 04h 02h 00h 01h 78h F0h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	00h
	Register value (Low Byte)	Byte 5	01h
CRC	Check sum (Low Byte)	Byte 6	78h
	Check sum (High Byte)	Byte 7	F0h

RAW VALUE AI3
(not yet implemented)

SCALED VALUE AI3
(GTF210)

Address: 53513 (decimal) / D109h (hexadecimal)

Format: 16 bit signed

Range: -580 - 2120

This register contains the scaled value (using the temperature sensor GTF210) of the analog input AI3. The interpretation of this value is controlled by the settings in the service menu (Celsius or Fahrenheit). The temperature sensor measures in a range of -30 ° C to + 100 ° C. The value is multiplied by 10 for precision purposes.

Register	GMM scaled value AI3															
Address (hex)	D109h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	Scaled value AI3 (-580 - 2120)															

In this example the scaled value of the resistance input AI3 will be read from the modbus member 1.

Command: 01h 04h D1h 09h 00h 01h D8h F4h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	09h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	D8h
	Check sum (High Byte)	Byte 8	F4h

Answer: 01h 04h 02h 01h 2Dh 78h BDh			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	01h
	Register value (Low Byte)	Byte 5	2Dh
CRC	Check sum (Low Byte)	Byte 6	78h
	Check sum (High Byte)	Byte 7	BDh

In this example the temperature is 30.1°C.

FUNCTION RESISTOR INPUT AI3

(0..10 V)

Address: 53514 (decimal) / D10Ah (hexadecimal)

Format: 16 bit unsigned

Range: 0-6

This register contains the value which represents the function of the analog input AI4. This function can be changed in the service menu of the GMM.

Register	GMM Function Voltage Input AI4															
Address (hex)	D10Ah															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Function Voltage Input AI4 (0-6)							

Value	Function	Value	Function
0	no function	4	Setpoint 2
2	Control value slave	6	Actual value 0..10 V
3	Setpoint 1		

In this example the function of the voltage input AI4 will be read from modbus member 1.

Command: 01h 04h D1h 0Ah 00h 01h 29h F4h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	0Ah
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	28h
	Check sum (High Byte)	Byte 8	F4h

Answer: 01h 04h 02h 00h 02h 38h F1h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	00h
	Register value (Low Byte)	Byte 5	02h
CRC	Check sum (Low Byte)	Byte 6	38h
	Check sum (High Byte)	Byte 7	F1h

In this example the function of the voltage input AI4 is "control value slave".

**RAW VALUE / VOLTAGE INPUT AI4
(0..10 V)**

Address: 53515 (decimal) / D10Bh (hexadecimal)

Format: 16 bit unsigned

Range: 0-120

This register contains the scaled value (using the temperature sensor GTF210) of the analog input AI3. The interpretation of this value is controlled by the settings in the service menu (Celsius or Fahrenheit). The temperature sensor measures in a range of -30 ° C to + 100 ° C. The value is multiplied by 10 for precision purposes.

Register	GMM scaled value AI3															
Address (hex)	D109h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	Scaled value AI3 (-580 - 2120)															

In this example the scaled value of the resistance input AI3 will be read from the modbus member 1.

Command: 01h 04h D1h 09h 00h 01h D8h F4h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	09h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	D8h
	Check sum (High Byte)	Byte 8	F4h

Answer: 01h 04h 02h 01h 2Dh 78h BDh			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	01h
	Register value (Low Byte)	Byte 5	2Dh
CRC	Check sum (Low Byte)	Byte 6	78h
	Check sum (High Byte)	Byte 7	BDh

In this example the temperature is 30.1°C.

SCALED VALUE AI4

Address: 53516 (decimal) / D10Ch (hexadecimal)

Format: 16 bit unsigned

Range: depending on sensor type

This register contains the scaled value of the analog input AI4. The value range of the analog input is 0..10V. The value is multiplied by 10 for precision purposes.

Register	Scaled value AI4															
Address (hex)	D10Ch															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	depending on sensor type															

Example: For this example, a pressure sensor with the value range 0 – 6 bar was used. The scaled value of the input AI4 is read.

Command: 01h 04h D1h 0Ch 00h 01h C8h F5h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	0Ch
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	C8h
	Check sum (High Byte)	Byte 8	F5h

In this example, the pressure is 1.2 bar.

Answer: 01h 04h 02h 00h 0Ch B9h 35h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	00h
	Register value (Low Byte)	Byte 5	0Ch
CRC	Check sum (Low Byte)	Byte 6	B9h
	Check sum (High Byte)	Byte 7	35h

STATUS MANUAL MODE

Address: 53517 (decimal) / D10Dh (hexadecimal)

Format: 16 bit unsigned

Range: 0-1

This register contains the status info of the manual mode.

Register	GMM Status manual mode															
Address (hex)	D10Dh															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Status manual mode (0-1)							

Value	Function
1	Manual mode ON
0	Manual mode OFF

In this example the status of the manual mode will be read from modbus member 1.

Command: 01h 04h D1h 05h 00h 01h 92h B1h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	0Dh
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	99h
	Check sum (High Byte)	Byte 8	35h

Answer: 01h 04h 02h 00h 00h B9h 30h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	00h
	Register value (Low Byte)	Byte 5	00h
CRC	Check sum (Low Byte)	Byte 6	B9h
	Check sum (High Byte)	Byte 7	30h

In this example the manual mode is deactivated.

CONTROL VALUE MANUAL MODE

Address: 53518 (decimal) / D10Eh (hexadecimal)

Format: 16 bit unsigned

Range: 0-100

This register contains the control value of the manual mode in percent.

Register	GMM Control value manual mode															
Address (hex)	D10Eh															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Control value manual mode (0-100)							

In this example the control value of the manual mode will be read from modbus member 1.

Command: 01h 04h D1h 0Eh 00h 01h 69h 35h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	0Eh
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	69h
	Check sum (High Byte)	Byte 8	35h

In this example, the pressure is 1.2 bar.

Answer: 01h 04h 02h 00h 3Ch B9h 21h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	00h
	Register value (Low Byte)	Byte 5	3Ch
CRC	Check sum (Low Byte)	Byte 6	B9h
	Check sum (High Byte)	Byte 7	21h

In this example the manual mode control value is set to 60%.

TYPE OF MOTORCONTROL

(GMM EC, GMM sincon, etc.)

Address: 53519 (decimal) / D10Fh (hexadecimal)

Format: 16 bit unsigned

Range: 0-255

This register describes the type of motorcontrol.

Register	GMM Type of motorcontrol															
Address (hex)	D10Fh															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Type of motorcontrol (0-255)							

Following motorcontrols are possible:

00h	GMM EC	04h	GMM phasecut
01h, 02h	GMM sincon	05h	GMM step professional
03h	GMM step basic	FFh	no motorcontrol

In this example, the type of the controller is read out.

Command: 01h 04h D1h 0Fh 00h 01h 38h F5h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	0Fh
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	38h
	Check sum (High Byte)	Byte 8	F5h

Answer: 01h 04h 02h 00h 02h 38h F1h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	00h
	Register value (Low Byte)	Byte 5	02h
CRC	Check sum (Low Byte)	Byte 6	38h
	Check sum (High Byte)	Byte 7	F1h

In this example it is a controller GMM sincon.

CURRENT ENERGIE CONSUMPTION OF ONE MOTOR OR IN TOTAL

Address: 53520..53536 (decimal) / D110h..D120 (hexadecimal)

Format: 16 bit unsigned

Range: 0 - 65535

These registers include the performance of individual motor or the total performance of the GMM EC

D110h: Total energy consumption [W]

D111h..D120h: Performance of motor X [W], where applies D111 = motor 1 .. D120 = motor 16

The register range depends on the number of connected fans.

Register	Current Energie Consumption of one Motor or in total															
Address (hex)	D110 h..D120 h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	Current Energie Consumption (0..65535)															

In this example the current energy consumption of motor 9 will be read from the modbus member 1.

Command: 01h 04h D1h 19h 00h 01h A0h F1h			
Address	Modbus member	Byte 1	01h
Function code	Lese Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	19h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	A0h
	Check sum (High Byte)	Byte 8	F1h

Answer: 01h 04h 02h 08h 5Ch BEh C9h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	08h
	Register value (Low Byte)	Byte 5	5Ch
CRC	Check sum (Low Byte)	Byte 6	BEh
	Check sum (High Byte)	Byte 7	C9h

In this example the energy consumption of fan 9 is 214W Read data as an array:

With the command: 01h 04h D1h 11h 00h 10h 98h FFh (hexadecimal) it is possible to read the registers D111..D120 (hexadecimal) as an array. The data length of the answer is 37 bytes.

CURRENT ENERGIE CONSUPTION OF ONE OR ALL VFD

Address: 53520..53529 (decimal) / D110h..D119 (hexadecimal)

Format: 16 bit unsigned

Range: 0 - 65535

These registers contain the current energy consumption of the fans of one Frequency converter (VFD) or of all.

D110h: Total energy consumption [W]

D111h..D119h: Single energy consumption [W], mit D111h = FU 1 .. D119h = FU 9

The register range depends on the number of connected fans.

Register	Current Energie Consumption of one or all VFD															
Address (hex)	D110h..D119h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	Current Energie Consumption (0..65535)															

Example: The current energy consumption of Frequency converter 9 will be read from modbus member 1.

Command: 01h 04h D1h 19h 00h 01h A0h F1h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	19h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	A0h
	Check sum (High Byte)	Byte 8	F1h

Answer: 01h 04h 02h 08h 5Ch BEh C9h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	08h
	Register value (LowByte)	Byte 5	5Ch
CRC	Check sum (Low Byte)	Byte 6	BEh
	Check sum (High Byte)	Byte 7	C9h

In this example the energy consumption of VFD9 is 214W.

MOTOR TEMPERATURE

(ONLY WITH GMM EC THREE-PHASE MOTOR)

Address: 53553..53568 (decimal) / D131h..D140 (hexadecimal)

Format: 16 bit unsigned

Range: 0-200

These registers contain the temperatures of the fans (motor temperature and the temperature of the electronic circuits). This values are only available for three-phase motors. With AC motors, although a value is returned, but this is not a temperature value.

D131h..D140h : D131h = motor 1 ..

D140h = motor 16

2 Bytes will be returned:

High Byte: Motor temperature (in °C)

Low Byte: Elektronik temperature of the motors (in °C)

The depth of the register arrays depends on the number of connected motors.

Register	GMM motor temperature															
Address (hex)	D131 h..D140 h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	Motor temperature								Electronic temperature inside motor							

In this example the Motor temperature of motor 9 will be read from modbus member 1.

Command: 01h 04h D1h 39h 00h 01h D8h FBh			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	39h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	D8h
	Check sum (High Byte)	Byte 8	FBh

Answer: 01h 04h 02h 34h 21h 6Fh E8h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	34h
	Register value (Low Byte)	Byte 5	21h
CRC	Check sum (Low Byte)	Byte 6	6Fh
	Check sum (High Byte)	Byte 7	E8h

In this example the motor temperature of fan 9 is 52°C and the temperature of the electronic circuits is 33°C.

Read as an array:

With the command: 01h 04h D1h 31h 00h 10h 99h 35h it is possible to read the registers D131..D140 as an array. The data length of the answer is 37 bytes.

HEATSINK TEMPERATURE

Address: 53569..53573(decimal) / D141h..D145h (hexadecimal)

Format: 16 bit unsigned

Range: 0-200

These registers contain the temperatures of the heatsinks (of the connected VFDs)

D141h..D145h : D141h = VFD 1,2 .. D145h = VFD 9

Byte1: Heatsink temperature VFD1 (°C)

Byte2: Heatsink temperature VFD2 (°C)

Register	Heatsink temperature															
Address (hex)	D141h..D145h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	Heatsink temperature FU 1								Heatsink temperature FU 2							

In this example the temperature of VFD 1 + 2 will be read from modbus member 1.

Command: 01h 04h D1h 41h 00h 01h 58h E2h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	41h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	58h
	Check sum (High Byte)	Byte 8	E2h

Answer: 01h 04h 02h 34h 21h 6Fh E8h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	34h
	Register value (LowByte)	Byte 5	21h
CRC	Check sum (Low Byte)	Byte 6	6Fh
	Check sum (High Byte)	Byte 7	E8h

In this example the heatsink temperature of VFD 1 is 52°C and the heatsink temperature of VFD2 is 33°C.

CURRENT FANSPEED

(IN RPM)

Address: 53585..53600 (decimal) / D151h..D160h (hexadecimal)

Format: 16 bit unsigned

Range: 0-65535

These registers contain the current fan speed of the connected fans in rpm.

D151h = motor 1 .. D160h = motor 16

The register range depends on the number of connected fans.

Register	GMM current fanspeed															
Address (hex)	D151..D160															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	Current fanspeed															

In this example the current fan speed of motor 6 will be read from modbus member 1.

Command: 01h 04h D1h 56h 00h 01h E8h E6h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	56h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	E8h
	Check sum (High Byte)	Byte 8	E6h

Answer: 01h 04h 02h 01h C5h 78h F3h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	01h
	Register value (Low Byte)	Byte 5	C5h
CRC	Check sum (Low Byte)	Byte 6	78h
	Check sum (High Byte)	Byte 7	F3h

In this example the current fan speed of fan 1 is 453 rpm.

Read as an array:

With the command: 01h 04h D1h 51h 00h 10h 99h 2Bh (hexadecimal) it is possible to read the registers D151..D160 (hexadecimal) as an array. The data length of the answer is 37 bytes.

FAULTS / ALARMS FROM GMM

Address: 53616 (decimal) / D170h (hexadecimal)

Format: 16 bit unsigned

Value range: 0-65535

This register contains information about the status of the GMM.

Error AI1: Fault at current input AI1
 Error AI2: Fault at current input AI2
 Error AI3: Fault at resistance input AI3
 Error AI4: Fault at voltage input AI4
 n.s. No sensor selected
 HardwareErr: Device fault, ALL faulty
 ECC Err No status word from EC controller
 r.* Reserved for internal use
 n.f. No function/free

Register	GMM faults/alarms															
Address (hex)	D170h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	HW Err	ECC Err	r.*	n.f.	n.f.	n.f.	n.f.	n.f.	n.s.	n.f.	r.*	r.*	Err AI4	Err AI3	Err AI2	Err AI1

In this example the GMM's faults/alarms are read out by Modbus subscriber 1.

Command: 01h 04h D1h 70h 00h 01h 09h 2Dh			
Address	Modbus subscriber	Byte 1	01h
Function code	Read input register	Byte 2	04h
Data	Register address (high byte)	Byte 3	D1h
	Register address (low byte)	Byte 4	70h
	Register value (high byte)	Byte 5	00h
	Register value (low byte)	Byte 6	01h
CRC	Checksum (low byte)	Byte 7	09h
	Checksum (high byte)	Byte 8	2Dh

Answer: 01h 04h 02h 00h 02h 38h F1h			
Address	Modbus subscriber	Byte 1	01h
Function code	Read input register	Byte 2	04h
Data	No. of bytes	Byte 3	02h
	Register value (high byte)	Byte 4	00h
	Register value (low byte)	Byte 5	02h
CRC	Checksum (low byte)	Byte 6	38h
	Checksum (high byte)	Byte 7	F1h

In this example the Error AI2 Alarm is set.

ERRORS/ALERTS OF EC MOTORS

Address: 53617..53632 (decimal) / D171h..D180h (hexadecimal)

Format: 16 bit unsigned

Range: 0-65535

These registers contain status information of the individual motors.

D171h : Motor 1 ... D180h : Motor 16

The depth of the register arrays depends on the number of connected motors.

Register	GMM Errors/Alerts GMM EC							
Address (hex)	D171 h..D180 h							
Value (format)	High Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
GMM Error 0 =no error 1 = error	X	InputOV	InputUV	SKF	Under-Volt	OverVolt	Brake	IntTemp

Register	GMM Errors/Alerts GMM EC							
Address (hex)	D171 h..D180 h							
Value (format)	Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
GMM Error 0 =no error 1 = error	Hallsen-sor	Wrong-Fan	MotBlock	CableBrk	FanFail	PowSup	ElecTemp	MotorTemp

InputOV: Input voltage too high

InputUV: Input voltage too low

SKF: Communication error between master and slave controller in the motor (power failure?)

UnderVolt: DC link undervoltage

OverVolt: DC link overvoltage

Brake: activated at external drive in reverse direction

IntTemp: internal temperature is too high

WrongFan: wrong fan or the VT-Number does not correspond to the system

MotBlock: motor is blocked

CableBrk: RS485 cable interrupted

FanFail: General error, this bit is set at every error

PowSup: power supply failure

ElecTemp: electronic circuit temperature is too high

MotorTemp: motor temperature is too high

In this example, the status information of the motor 5 are queried at Modbus member 1

Command: 01h 04h D1h 75h 00h 01h 19h 2Ch			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	75h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	19h
	Check sum (High Byte)	Byte 8	2Ch

Answer: 01h 04h 02h 00h 09h 79h 36h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	00h
	Register value (LowByte)	Byte 5	09h
CRC	Check sum (Low Byte)	Byte 6	79h
	Check sum (High Byte)	Byte 7	36h

In this example motor 5 has got a motor temperature problem (FanFail + MotorTemp)

Read data as an array:

With the command: 01h 04h D1h 70h 00h 11h 08h E1h (hexadecimal) it is possible to read the registers D170h..D180h (hexadecimal) as an array. The data length of the answer is 39 bytes.

CURRENT FANSPEED AS PERCENTAGE OF THE MAXIMUM SPEED

Address: 53633..53648 (decimal) / D181h..D190h (hexadecimal)

Format: 16 bit unsigned

Range: 0-100

These registers contain the current fan speed as percentage of the maximum speed.

D181h = fan 1 ..

D190h = fan 16

The register range depends on the number of connected motors.

Register	GMM Current Fanspeed as percentage of the Maximum Speed															
Address (hex)	D181 h..D190 h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Current Fanspeed as percentage							

In this example, the fan speed in percentage of maximum fan speed of Motor 6 at modbus member 1 will requested.

Command: 01h 04h D1h 86h 00h 01h E9h F1h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	86h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	E9h
	Check sum (High Byte)	Byte 8	F1h

Answer: 01h 04h 02h 00h 32h 38h E5h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	00h
	Register value (LowByte)	Byte 5	32h
CRC	Check sum (Low Byte)	Byte 6	38h
	Check sum (High Byte)	Byte 7	E5h

In the example, the engine speed is 50% of the maximum speed.

Read data as an array:

With the command: 01h 04h D1h 81h 00h 10h 98h D2h (hexadecimal) it is possible to read the registers D181h..D190h (hexadecimal) as an array. The data length of the answer is 37 bytes.

ERRORS / ALARMS / IO-STATE OF THE VFD

Address: 53644..53672 (decimal) / D1A0h..D1A8h (hexadecimal)

Format: 16 bit unsigned

Range: 0-65535

These registers contain information about the current status of the frequency converter.

D1A0h:	VFD1	D1A5h:	VFD6
D1A1h:	VFD2	D1A6h:	VFD7
D1A2h:	VFD3	D1A7h:	VFD8
D1A3h:	VFD4	D1A8h:	VFD9
D1A4h:	VFD5		

Register	Errors / Alarms / IO-state of the VFD															
Address (hex)	D1A0h..D1A8h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	ISD00	ISD01	ISD02	ISD03	OSD02	OSD01	OSD00	EN-PO	Errorcode of the FQ							

In this example, the status of the frequency converter 5 of Modbus member 5 is read.

Command: 01h 04h D1h A4h 00h 01h 49h 15h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	A4h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	49h
	Check sum (High Byte)	Byte 8	15h

Answer: 01h 04h 02h 07h 01h 7Ah C0h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	E3hh
	Register value (LowByte)	Byte 5	00h
CRC	Check sum (Low Byte)	Byte 6	74h
	Check sum (High Byte)	Byte 7	C0h

In this example digital inputs ISD00, ISD01, ISD02 are high, ISD03 is low, the digital outputs OSD02 and OSD01 are low, output OSD00 is high and input ENPO is high, and the VFD has no error.

The Lowbyte contains the errorcode of the VFD.

Error Code	Description
01h	Collective Fault
02h	undervoltage, voltage off
03h	overcurrent
04h	overvoltage
05h	lxlxt power of motor
06h	lxt power of FQ
07h	overtemperature of FQ
08h	Error CAN-Bus in FQ detected
09h	CAN-Bus line break to FQ detected, FQ does not answer or has no power connection

The Highbyte contains the information of the digital inputs/outputs of the VFD.

High byte	Status of digital IO of VFD
Bit	Description
0	State of digital input ENPO (Release) 1 = high level (+24 V) on input, VFD Release OK 0 = low level (0 V or open) on input, VFD not released
1	State of digital output OSD00 (VFD Operation) 1 = output level = +24 V, VFD in operation 0 = output level = 0 V, VFD not in operation
2	State of digital output OSD01 (VFD Thermal Protection Reset) 1 = output level = +24 V, Thermal Protection Reset active 0 = output level = 0 V, Thermal Protection Reset not active (on this output a short reset impulse will be given out)
3	State of digital output OSD02 (Threshold) 1 = output "normaly open" is closed 0 = output "normaly closed" is closed
4	State of the digital input ISD03 (not used) 1 = high level (+24 V) on input 0 = low level (0V or open) on input
5	State of the digital input ISD02 (Protection Devices) 1 = high level (+24 V) on input, Protection OK 0 = low level (0V or open) on input, Protection NOK
6	State of the digital input ISD01 (Thermal Monitoring Fan) 1 = high level (+24 V) on input, Thermal Protection OK 0 = low level (0V or open) on input, Thermal Protection NOK
7	State of the digital input ISD00 (Clockwise Rotating Field) 1 = high level (+24 V) on input, Rotating Field is Clockwise, OK 0 = low level (0V or open) on input, Rotating Field is not Clockwise, NOK

OPERATING HOURS PER FAN

Address: 53673..53688 (decimal) / D1A9h..D1B8h (hexadecimal)

Format: 16 bit unsigned

Range: 0-65535 [h]

These registers includes the operating hours of the EC fans.

D1A9h = fan 1 .. D1B8h = fan 16

The depth of the register arrays depends on the number of connected motors.

Register	Operating hours per fan															
Address (hex)	D1A9 h..D1B8 h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	Operating hours per fan (0-65535)															

In this example, the operating hours of EC fan number 6 is read.

Command: 01h 04h D1h AEh 00h 01h 69h 17h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D1h
	Register Address (Low Byte)	Byte 4	AEh
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	69h
	Check sum (High Byte)	Byte 8	17h

Answer: 01h 04h 02h 04h C9h 7Bh A6h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	04h
	Register value (LowByte)	Byte 5	C9h
CRC	Check sum (Low Byte)	Byte 6	7Bh
	Check sum (High Byte)	Byte 7	A6h

In the example of the EC fan number 6 has 1225 operating hours.

With the command: 01h 04h 00h 10h 18h DAh D1h A9h it is possible to register D1A9 h..D1B8 h read as an array.

CURRENT AIR VOLUME AS PERCENTAGE OF THE MAXIMUM AIR VOLUME

Address: 53760 (decimal) / D200h (hexadecimal)

Format: 16 bit unsigned

Range: 0-100

Dieses Register beinhaltet das Luftvolumen in Prozent des Maximalluftvolumen.

Register	GMM air volume in % of maximum air volume															
Address (hex)	D200h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	current air volume							

In this example, the current air volume of Modbus member 1 is queried.

Command: 01h 04h D1h 86h 00h 01h E9h F1h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D2h
	Register Address (Low Byte)	Byte 4	00h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	08h
	Check sum (High Byte)	Byte 8	B2h

Answer: 01h 04h 02h 00h 32h 38h E5h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	00h
	Register value (LowByte)	Byte 5	32h
CRC	Check sum (Low Byte)	Byte 6	38h
	Check sum (High Byte)	Byte 7	E5h

The current air volume is 50%

STATUS OF DIGITAL OUTPUTS OF GMM

Address: 53761 (decimal) / D201h (hexadecimal)

Format: 16 bit unsigned

Range: bitwise

These registers include the status of the digital outputs of the GMM.

Register	Status of digital outputs of GMM															
Address (hex)	D201h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	D04	D03	D02	D01

DO1..DO4 : the digital outputs of the GMM

Example: The status of the digital outputs of the GMM is read from Modbus member 1.

GMM digital output (n.F. = no function)	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	D04	D03	D02	D01
contact x1/x2 connected (normally closed) (L)														x	x		x
contact x1/x4 connected (normally open) (H)																x	

Register	Status of digital outputs of GMM															
Address (hex)	D201															
Status digital outputs (bin)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L

Register	Status of digital outputs of GMM															
Status digital outputs (hex)	0				0				0				2			

Command: 01h 04h D2h 01h 00h 01h 59h 72h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D2h
	Register Address (Low Byte)	Byte 4	01h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	59h
	Check sum (High Byte)	Byte 8	72h

Answer: 01h 04h 02h 00h 02h 38h F1h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	00h
	Register value (LowByte)	Byte 5	02h
CRC	Checks um (Low Byte)	Byte 6	38h
	Check sum (High Byte)	Byte 7	F1h

In this example, on output DO2 contact x1 and x4 is connected

STATUS OF STEPS OF STEP CONTROLLER
(ONLY AVAILABLE AT GMM STEP!)

Address: 53762 (decimal) / D202h (hexadecimal)

Format: 16 bit unsigned

Range: bitwise

The GMM steps has inside a step controller-unit with 1 to 9 steps. With this register, the status of each step can be read out. This register contains the state of the steps (0 = OFF, 1 = ON). The number of Steps can be read from Register "Number of Steps"

Register	Status of steps															
Address (hex)	D202h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
State of the Step (n.f. = no function)	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	step 9	step 8	step 7	step 6	step 5	step 4	step 3	step 2	step 1

Example: The state of the steps will be read from modbus member 1. GMM Step has 8 Steps!

State of the step (n.f. = no function)	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	step 9	step 8	step 7	step 6	step 5	step 4	step 3	step 2	step 1
active (H)													x	x	x	x
not active (L)								-	x	x	x	x				

Register	Status of steps															
Address (hex)	D202h															
Status of steps (bin)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Status of steps (bin)	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H
Status of steps (hex)	0				0				0				0			

Command: 01h 04h D2h 02h 00h 01h A9h 72h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D2h
	Register Address (Low Byte)	Byte 4	02h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	A9h
	Check sum (High Byte)	Byte 8	72h

Answer: 01h 04h 02h 00h 0Fh 38h F1h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	00h
	Register value (LowByte)	Byte 5	0Fh
CRC	Check sum (Low Byte)	Byte 6	38h
	Check sum (High Byte)	Byte 7	F1h

In this example the steps 1,2,3 and 4 are active, all other not active

NUMBER OF ERROR MESSAGES OF GMM
(ONLY AVAILABLE AT GMM STEP PROFESSIONAL!)

Address: 53763 (decimal) / D203h (hexadecimal)

Format: 16 bit unsigned

Range: 0-9

This register contains the number of error inputs of the GMM Step.

Only while commissioning, the number of error inputs can be configured.

In general, the auxiliary contacts of the motor protective circuit are wired to these inputs.

The state of these inputs can be read out from Input-Register "State of the digital inputs of GIOD"

Register	Number of error messages of GMM step															
Address (hex)	D203h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	0	0	0	0	0	0	0	0	Number of error messages (1-9)							

Example: The number error messages will be read from modbus member 1.

Command: 01h 04h D2h 03h 00h 01h F8h B2h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D2h
	Register Address (Low Byte)	Byte 4	03h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	F8h
	Check sum (High Byte)	Byte 8	B2h

Answer: 01h 04h 02h 00h 08h B8h F6h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	00h
	Register value (LowByte)	Byte 5	08h
CRC	Check sum (Low Byte)	Byte 6	B8h
	Check sum (High Byte)	Byte 7	F6h

In this example, the GMM Steps has 8 Error messages.

STATUS OF DIGITAL OUTPUTS OF GIOD

(ONLY AVAILABLE AT GMM STEP!)

Address: 53764 (decimal) / D204h (hexadecimal)

Format: 16 bit unsigned

Range: bitwise

This register contains the status of the outputs of GIOD.

Register	Status of digital outputs of GIOD															
Address (hex)	D204h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	D08	D07	D06	D05	D04	D03	D02	D01

D01..D08 : the digital outputs of the GIOD

Example: The state of the digital outputs will be read from modbus member 1.

GIOD outputs (n.F. = no function)	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	n.F.	D08	D07	D06	D05	D04	D03	D02	D01
contact x3/x4 not connected (normally open) (L)									x	x		x		x		
contact x3/x4 connected (H)											x		x		x	x

Register	Status of digital outputs of GIOD															
Address (hex)	D204h															
Status of steps (bin)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Status of steps (bin)	L	L	L	L	L	L	L	L	L	L	H	L	H	L	H	H
Status of steps (hex)	0				0				2				B			

Command: 01h 04h D2h 04h 00h 01h 49h 73h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D2h
	Register Address (Low Byte)	Byte 4	04h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	49h
	Check sum (High Byte)	Byte 8	73h

Answer: 01h 04h 02h 00h 2Bh F9h 2Fh			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	00h
	Register value (LowByte)	Byte 5	2Bh
CRC	Check sum (Low Byte)	Byte 6	F9h
	Check sum (High Byte)	Byte 7	2Fh

STATUS OF THE DIGITAL INPUTS OF GIOD

(ONLY AVAILABLE AT GMM STEP!)

Address: 53765 (decimal) / D205h (hexadecimal)

Format: 16 bit unsigned

Range: 0h-FFFFh

This register contains the state of the digital inputs of the GIOD.

Register	Status of digital outputs of GIOD															
Address (hex)	D205h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	DI16	DI15	DI14	DI13	DI12	DI11	DI10	DI9	DI8	DI7	DI6	DI5	DI4	DI3	DI2	DI1

DI1..DI16 : the digital inputs of the GIOD

Example: The state of the digital inputs will be read from modbus member 1.

GIOD input	DI16	DI15	DI14	DI13	DI12	DI11	DI10	DI9	DI8	DI7	DI6	DI5	DI4	DI3	DI2	DI1
Input-voltage = +24V (H)								x					x	x	x	x
Input-voltage = 0 V or open (L)	x	x	x	x	x	x	x		x	x	x	x				

Register	Status of the digital inputs of GIOD															
Address (hex)	D205h															
Status of steps (bin)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Status of steps (bin)	L	L	L	L	L	L	L	H	L	L	L	L	H	H	H	H
Status of steps (hex)	0				1				0				F			

Command: 01h 04h D2h 05h 00h 01h 18h B3h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D2h
	Register Address (Low Byte)	Byte 4	05h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	18h
	Check sum (High Byte)	Byte 8	B3h

Answer: 01h 04h 02h 01h 0Fh F8h A4h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	01h
	Register value (LowByte)	Byte 5	0Fh
CRC	Check sum (Low Byte)	Byte 6	F8h
	Check sum (High Byte)	Byte 7	A4h

The digital inputs DI1, DI2, DI3, DI4 are wired with high-level.

STATUS INFO GMM

Address: 53766 (decimal) / D206h (hexadecimal)

Format: 16 bit unsigned

Range: 0h-FFFFh

This register contains status information of the GMM controller. The following table represents an allocation of the bits of this register to the functions / messages of GMM controller.

Bit No.	Status Info GMM (High Byte)	Status Info GMM (Low Byte)
0	1 = setpoint 2 active	1 = emergency value is put out
1	1 = nightsetback active	1 = External bus module has logged on
2	0 = cooling, 1 = heating	1 = Operating message
3	1 = offset setpoint positive active	1 = Error message (PRIO 1 or PRIO 2)
4	1 = Maintenance run active	free
5	1 = Invers operation active (only GMM EC)	free
6	1 = fan from external active (only GMM EC)	free
7	1 = threshold value exceeded (only GMM EC)	free

Register	Status Info GMM															
Address (hex)	D170h															
Value (format)	High Byte								Low Byte							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Value	Status Info GMM (0h-FFFFh)															

In this example, the status information of the GMM of Modbus member 1 are read.

Command: 01h 04h D2h 06h 00h 01h E8h B3h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Register Address (High Byte)	Byte 3	D2h
	Register Address (Low Byte)	Byte 4	06h
	Register value (High Byte)	Byte 5	00h
	Register value (Low Byte)	Byte 6	01h
CRC	Check sum (Low Byte)	Byte 7	E8h
	Check sum (High Byte)	Byte 8	B3h

Answer: 01h 04h 02h 00h 0Ah 39h 37h			
Address	Modbus member	Byte 1	01h
Function code	Read Input Register	Byte 2	04h
Data	Byte count	Byte 3	02h
	Register value (High Byte)	Byte 4	00h
	Register value (Low Byte)	Byte 5	0Ah
CRC	Check sum (Low Byte)	Byte 6	39h
	Check sum (High Byte)	Byte 7	37h

If one byte 4 and byte 5 is binary, the result is the bit combination 0000 0000 0000 1010b. According to the assignment table is an external bus module on GMM has registered and there is a PRIO 1 or PRIO 2 error.

NOTES

